

REMARKS

By the present amendment, independent claim 1 has been amended to further clarify the concepts of the present invention. In particular, independent claim 1 has been amended to incorporate the subject matter of dependent claims 2 and 3 therein and, accordingly, these latter claims have been canceled. In addition, claim 1 has been amended to recite "continuously" blowing chlorine gas. It is submitted that this amendment is supported by lines 17-20 of page 16 and lines 3-6 of page 18 of the subject specification. Entry of these amendments is respectfully requested.

In the Office Action, claims 1-6 and 9-21 were rejected under 35 USC § 103(a) as being unpatentable over the patents to Duggan, Atwood et al and Cain. In making the rejection, it was alleged that the cited Duggan patent teaches the process as claimed in claim 1, with the exception of (a) specifics as steps (1) and (2) in terms of the chlorine-aided leaching step and the copper ion reduction step and (b) the use of step (5) in terms of iron electrowinning. The Atwood et al patent was then alleged to teach the specifics as to (a) and the Cain patent was alleged to teach the use of (b) in the refining of raw copper. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

It is submitted that the patents to Atwood et al, Duggan and Cain do not teach or suggest the presently claimed invention, whether taken singly or in combination. More particularly, none of the cited patents teach or suggest, among other things, the chlorine-aided leaching step as presently claimed. The Atwood et al patent, relied upon for allegedly teaching this step, appears to disclose treating chalcopyrite ore to create a cuprous-ferrous

chloride by (1) a leaching step for leaching raw copper material in an acidic, aqueous chloride solution to produce a product liquor containing copper ion and residue containing elemental sulfur and (2) a copper ion reduction step for reducing the leaching product liquor in the presence of a reductant.

However, it is submitted that the statement of rejection that the Atwood et al patent teaches the specifics as to steps (1) and (2) has expanded the teachings of the patent in at least one respect beyond what it fairly teaches. Among other things, step (1) according to the Atwood et al patent is not a chlorine-aided leaching step in the presence of chlorine in an acidic, aqueous chloride solution as claimed. There is no specific teaching in the cited patent of such a step.

Furthermore, and specifically with respect to amended claim 1 which now recites blowing chlorine gas into the acidic, aqueous chloride solution, it was alleged in the rejection that the Atwood et al patent teaches that make-up chlorine may be added to the process solution and one of ordinary skill in the art would have considered it obvious do so by blowing the make-up chlorine into the acidic, aqueous solution. However, it is clear from the cited portion of the Atwood et al patent (lines 10-26 of column 15) that this teaching is specifically directed to the maintenance of "the inventory of required reagents in the process solution" (lines 14-15) and is for "required agents for make-up" (lines 21-22). In particular, lines 23-24 state "Additional chloride ion as required can be introduced." Thus, it is evident that chlorine is added according to the Atwood et al patent only to compensate for reactants lost during ordinary operation of the process.

In contrast, in the claimed chlorine-aided leaching step accomplished by blowing chlorine gas into the acidic, aqueous chloride solution, the presence of chlorine actively provides an important effect in terms of the operation of the leaching step. As mentioned above, the subject matter of dependent claim 2 has been incorporated into independent claim 1 to recite that the chlorine-aided leaching is accomplished by blowing chlorine gas into the acidic, aqueous chloride solution. Further, independent claim 1 has also been amended to recite that the chlorine gas is blown continuously in order to further emphasize the above distinctions over the Atwood et al patent.

Furthermore, as a result of the incorporation of the subject matter of dependent claim 3 into independent claim 1, the chlorine-aided leaching step is effected at an oxidation-reduction potential (ORP) of 500 to 600 mV. This range of ORP is extremely important in the presently claimed invention. As is apparent from the disclosure at page 17, lines 4-12 of the subject specification. As is set forth therein, when the ORP is below 500 mV, the copper extraction tends to be insufficient, because of insufficient oxidative power for the leaching step, whereas when the ORP is above 600 mV, the sulfur tends to be excessively oxidized.

In order to achieve this stated range of ORP, chlorine gas must be blown in the chlorine-aided leaching step. However, in the cited patents, chlorine gas blowing is not disclosed or suggested and, thus, this range of ORP is not achieved. For example, according to the Atwood et al patent, the ORP during the reaction is lowered to be below 500 mV at the end of the reaction as is set forth in Table II therein. Therefore copper extraction would be insufficient.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103(a) and allowance of claims 1, 4-6 and 9-21 as amended over the cited patents are respectfully requested.

Dependent claims 7 and 8 were rejected under 35 USC 103(a) as being obvious over the same patents to Duggan, Atwood et al and Cain further in view of the patent to Baczek et al. In addition, dependent claim 22 was rejected under 35 USC 103(a) as being obvious over the same patents to Duggan, Atwood et al and Cain further in view of the patent to Subramanian et al. In making the former rejection, it was alleged that the additionally cited patent to Baczek et al discloses that the size of milled chalcopryite particles affects the efficiency of a copper leaching process. In the latter rejection, it was asserted that the Subramanian et al patent teaches the use of a second electrorefining step in producing silver slime. In each rejection, it was concluded that it would be obvious to one of ordinary skill to utilize the additional teaching in conjunction with the other teachings. Reconsideration of these rejections in view of the above claim amendments and the following comments is respectfully requested.

The above remarks relative to the teaching deficiencies of the patents to Duggan, Atwood et al and Cain are reiterated with regard to this rejection. It is submitted that the patents to Baczek et al and Subramanian et al do not supply these teaching deficiencies with respect to the subject matter of independent claim 1 and the claims dependent thereon. Thus, it is submitted that the same considerations as were set forth above regarding each of the primary patents would be applicable to these rejections as well.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. § 103(a) and allowance of dependent claims 7, 8 and 22 over the cited patents are respectfully requested.

In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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